

### REMARKS

Claims 1-17 are currently pending in the subject application. By the instant amendment, new claims 29 and 30 are added, and claims 1, 5, 10 and 14 are amended to more particularly claim the subject matter of the present invention. No new matter is added by new claims 29 and 30 or the amendments to claims 1, 5, 10 and 14, as the subject matter thereof may be found in the specification as originally filed at paragraphs [0042], [0043] and [0048].

Applicants appreciate the Examiner's acknowledgment of applicants' claim for priority under 35 C.F.R. §1.119, and receipt of a certified copy of the priority document. Applicants also appreciate the Examiner's acknowledgment of the applicants' election of Group I, claims 1-17, for prosecution in the subject application.

Claims 1-17, 29 and 30 are presented to the Examiner for further or initial prosecution on the merits.

#### A. Introduction:

In the Office Action mailed on May 9, 2003, the Examiner rejected claims 1-9 under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 4,467,345 to Ozawa ("the Ozawa reference"). The Examiner rejected claims 10-12 and 14-16 under 35 U.S.C. § 103(a) as being unpatentable over the Ozawa reference in view of United States Patent No. 5,229,642 to Hara et al. ("the Hara et al. reference"). The Examiner rejected claims 13 and 17 under 35 U.S.C. § 103(a) as being unpatentable over the Ozawa reference in view of the Hara et al. reference, and further in view of United States Patent No. 4,385,591 to Matsukawa ("the Matsukawa reference").

#### B. Asserted Rejections Under 35 U.S.C. § 102

In the outstanding Office Action, the Examiner rejected claims 1-9 under 35 U.S.C. § 102(b) as being anticipated by the Ozawa reference.

However, this rejection is respectfully traversed, as independent claims 1 and 5 have been amended to overcome the cited prior art reference. Specifically, claim 1 has been amended to include the limitation that two adjacent metal line patterns are spaced a predetermined distance less than 10  $\mu\text{m}$  apart from each other, and claim 5 has been amended to include the limitation that the plurality of metal line patterns are spaced less than 10  $\mu\text{m}$  apart from each other.

The Ozawa reference does not teach or suggest metal line patterns that are spaced less than 10  $\mu\text{m}$  apart from each other, as claimed in independent claims 1 and 5 of the subject application. Rather, the Ozawa reference teaches the metal line patterns are spaced a distance of 10  $\mu\text{m}$  apart.

Therefore, claims 1, 5, and claims 2-4 and 6-9, which are respectively dependent therefrom, are believed to be patentable over the cited prior art reference and in condition for allowance. Accordingly, reconsideration and withdrawal of the rejections of claims 1-9 are respectfully requested.

C. Asserted Rejection of Claims 10-12 and 14-16 Under 35 U.S.C. § 103(a)

In the outstanding Office Action, the Examiner rejected claims 10-12 and 14-16 under 35 U.S.C. § 103(a) as being unpatentable over the Ozawa reference in view of the Hara et al. reference.

However, this rejection is respectfully traversed, as independent claims 10 and 14 have been amended to overcome the cited prior art references. Specifically, claims 10 and 14 have been amended to include the limitation that metal line patterns are spaced less than 40  $\mu\text{m}$  apart from each other.

As previously stated, the Ozawa reference does not teach or suggest adjacent metal line patterns that are spaced less than 10  $\mu\text{m}$  apart from each other. In addition, the Ozawa

reference does not teach or suggest a slit formed in a metal line pattern, as claimed in claims 10 and 14 of the subject application.

The Hara et al. reference does not teach or suggest a plurality of metal line patterns, wherein adjacent metal line patterns are spaced less than 10  $\mu\text{m}$  apart from each other, and at least one of the adjacent metal line patterns has a slit, as substantially claimed in claims 10 and 14 of the subject application. Rather, the Hara et al. reference teaches forming L-shaped slits in corner portions of a guard ring (wiring portion) formed along a peripheral edge of a tetragonal semiconductor substrate to reduce stress to the corners of the peripheral edge of a semiconductor chip.

In view of the differences between the subject application as claimed and the cited prior art references described above, independent claims 10 and 14 are believed to be patentably distinguished over the cited prior art references and in condition for allowance. In addition, claims 11-12 and 15-16, which depend from claims 10 and 14, respectively, are believed to be similarly allowable as depending from an allowable base claim.

Accordingly, reconsideration and withdrawal of the rejections of claims 10-12 and 14-16 are respectfully requested.

D. Asserted Rejection of Claims 13 and 17 Under 35 U.S.C. § 103(a)

In the outstanding Office Action, the Examiner rejected claims 13 and 17 under 35 U.S.C. § 103(a) as being unpatentable over the Ozawa reference in view of the Hara et al. reference and further in view of the Matsukawa reference.

However, this rejection is respectfully traversed, as claims 13 and 17 are believed to be patentably distinguished over the combination of cited prior art references.

Further, it is respectfully submitted that there is no suggestion or motivation to combine these cited references, and that any such combination thereof to reject the claims of the subject application is improper hindsight reconstruction.

Statement of the Law Regarding the Required Suggestion  
or Motivation to Combine or Modify Art Under 35 U.S.C. § 103

It is not enough that one may modify a reference in view of a second reference, but rather it is required that the second reference suggest the modification of the first reference, and not merely provide the capability of modifying the first reference.

It is well-settled law that for a claimed invention to be rejected on grounds of obviousness, the prior art must suggest the modifications sought to be patented. *See In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984); *see also ACS Hospital Systems, Inc. v. Montefiore Hospital*, 221 USPQ 929, 933 (Fed. Cir. 1984). In fact, the United States Court of Appeals for the Federal Circuit ("Federal Circuit") has stated: "[w]hen determining the patentability of a claimed invention which combines two known elements, 'the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'" *In re Beattie*, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992) (quoting *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 488 (Fed. Cir. 1984)).

The MPEP states at § 2142:

"To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

The MPEP also states at § 2143.01:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

Further, the Federal Circuit determined that to establish a prima facie case of obviousness, Denso must show "some objective teaching in the prior art or that knowledge

generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.” Fine, 837 F.2d at 1074, 5 USPQ2d at 1598. There is no suggestion to combine, however, if a reference teaches away from its combination with another source. See *id.* at 1075, 5 USPQ2d at 1599. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant . . . [or] if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.” *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). *Tec Air Inc. v. Denso Manufacturing Michigan Inc.*, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999).

In rejecting claims 13 and 17, the Examiner states:

[C]laims 13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa in view of Hara *et al.* as applied to claims 12 and 14 above, and further in view of Matsukawa. Ozawa as modified by Hara *et al.* teaches the limitations of claims 12 and 14 as described above. Matsukawa (US 4,835,591) teaches a slit in an adjacent metal line pattern which 13. spaced less than 4  $\mu\text{m}$  from the edge of the metal line pattern [column 4, line 66]. It would have been obvious to one of ordinary skill in the art to use this distance for the metal slit of Hara *et al.* in the device of Ozawa since this distance prevents the formation of hillocks on the metal line [column 4, lines 67-68].

*The Office Action of May 9, 2003, at p. 5.*

As stated by the Examiner, the Matsukawa reference teaches forming grooves or indentations in a wiring portion to prevent the formation of hillocks that create a short circuit between two wiring portions of a semiconductor integrated circuit. In fact, the Matsukawa reference teaches that prevention of hillocks is the sole reason for forming grooves in the wiring portion, and that as a result, the grooves may be formed to have a much thinner width

than that of the narrowest wiring portion, so that almost none of the total area of the wiring portion is lost. Specifically, the Matsukawa reference teaches at col. 4, lines 26-35:

[S]ince the groove 3c is formed solely to prevent the material (aluminum alloy) which forms the wiring from displacing toward the edge 3b of the wiring portion 3 after the material has been softened during annealing, the width of the groove 3c may be much smaller than the width of the narrowest wiring portion in an ordinary wiring pattern. Accordingly, the formation of the groove 3c in the wiring portion 3 causes only a very small fraction of the total area of the wiring portion 3 to be lost.

*The Matsukawa reference at col. 4, lines 26-35.*

As indicated above, the Matsukawa reference teaches at col. 4, lines 26-35, that because the grooves are solely for preventing hillocks, the width of the grooves may be “much smaller than the width of the narrowest wiring portion in an ordinary wiring pattern,” so that “only a very small fraction of the total area of the wiring portion [is] lost.”

Therefore, not only does the Matsukawa reference lack any teaching or suggestion directed toward reducing the area of the wiring layer to prevent formation of cracks, but the Matsukawa reference teaches a method of forming grooves in a wiring portion such that almost none of the total area of the wiring portion is lost, and further teaches that maintaining nearly the entire total area of the wiring portion is advantageous.

Contrary to the teachings of the Matsukawa reference, both the Ozawa reference and the Hara et al. reference teach methods and structures for reducing the total area of a wiring portion. More particularly, the Ozawa reference teaches dividing a wiring into two or more, narrow wirings, to thereby reduce the surface on which large grain size phospho-silicate glass forms, as indicated at col. 2, lines 50–58 thereof, and the Hara et al. reference teaches at col. 2, lines 41-55; col. 5, lines 17-26; and col. 6, lines 51-58, that the purpose of the invention is to reduce the effective width, or area, of a guard ring (wiring portion) by forming slits in corner portions of the guard ring, to thereby reduce stress at corners of a passivation

film and prevent formation of cracks therein. Specifically, at col. 2, lines 41-46, the Hara et al. reference teaches:

[I]t is, accordingly, considered that, in order to reduce the stresses which the aluminum guard ring at the corner parts exerts on the passivation films nearby, the effective width of the guard ring at the chip corner parts should be made small, i.e., the exposed area of the guard ring is reduced.

*The Hara et al. reference at col. 2, lines 41-46.*

Therefore, as previously stated, since the Matsukawa reference teaches maintaining the area of a guard ring (wiring portion), while the Ozawa reference and the Hara et al. reference teach reducing the area of a wiring portion, it is respectfully submitted that the Matsukawa reference teaches away from both the Ozawa and the Hara et al. references.

Accordingly, it is respectfully submitted that there is no motivation or suggestion to combine the teachings of the Matsukawa reference with those of the Ozawa reference or the Hara et al. reference, and that any such combination thereof to reject the claims of the subject application is improper.

Further, it is respectfully submitted that the combination of cited prior art references does not anticipate or render obvious claims 13 and 17 of the subject application. None of the Matsukawa reference, the Ozawa reference nor the Hara et al. reference teaches or suggests adjacent metal line patterns that are spaced less than 10  $\mu\text{m}$  apart from each other, as claimed in claims 10 and 14 of the subject application, from which claims 13 and 17 depend.

Accordingly, claims 13 and 17 are believed to be in condition for allowance, and a notice to such effect is respectfully requested.

E. New Claims 29 and 30

New claim 29 is believed to be in condition for allowance, as none of the cited prior art references alone or combined teaches or suggests a plurality of metal line patterns,

wherein two adjacent metal line patterns are spaced less than  $1.5\text{ }\mu\text{m}$  apart from each other, and at least one of the two adjacent metal line patterns has a slit, as claimed in new claim 29.

New claim 30 is believed to be incondition for allowance, as none of the cited prior art references teaches or suggests a semiconductor device having a multi-layered structure, in which a slit is formed less than  $4\text{ }\mu\text{m}$  from a space between two adjacent metal line patterns in order to prevent a crack from occurring in an underlying layer, as claimed in claim 30.

Specifically, the Ozawa reference neither teaches nor suggests forming a slit in a metal line pattern, the Hara et al. reference does not teach or suggest forming a slit that is  $4\text{ }\mu\text{m}$  from a space between adjacent metal line patterns, and the Matsukawa reference, as previously stated, teaches away from the remaining cited prior art references by teaching formation of a groove for the sole purpose of preventing a hillock, such that the area of a wiring layer is almost entirely maintained. Therefore, it is respectfully submitted that combining the Matsukawa reference with the remaining prior art references to reject claim 30 of the subject application would be improper.

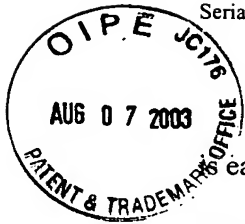
Accordingly, claims 29 and 30 are believed to be in condition for allowance, and an early and favorable action on both is respectfully requested.

#### F. Conclusion

Since none of the cited prior art references, alone or in combination, either anticipate or render obvious claims 1-17, 29 and 30 of the subject application, it is respectfully submitted that claims 1-17, 29 and 30 are in condition for allowance, and a notice to such effect is respectfully requested.

Finally, if the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.






In view of the foregoing amendments and remarks, reconsideration of this application earnestly solicited, and an early and favorable action upon all of the claims is hereby requested.

Respectfully submitted,

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PETITION and  
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.